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RELIABILITY OF THE TUBERCULIN TEST

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Various kinds of tests have done much to facilitate the progress of mankind. Some are of simple mechanical nature; others relate to highly specialized sciences. Within the memory of the present generation many technical tests have been developed with resulting benefit to agriculture. The chemical test for determining butterfat in milk is a familiar example. Others have to do with the fertility of the soil and the nutritive properties and purity of foods.

In human and veterinary medicine there are likewise many tests to determine the presence of certain diseases and the freedom of the body from various disorders. Among such tests is the use of tuberculin for determining the presence of tuberculosis, sometimes called the "captain of the men of death." The test is based on well-established scientific principles evolved by more than 25 years of experimental work prior to 1917, when the cooperative work of tuberculosis eradication began. It is among the most dependable tests for disease. Yet, because this test is widely used as a basis for detecting and condemning tuberculous livestock, its dependability is sometimes questioned, and uninformed critics have publicly made many unfounded statements concerning its use.

A review of the literature, and a careful study of the developments in connection with the control and eradication of tuberculosis among livestock, can not help but convince any fair-minded person that the tuberculin test as used in the tuberculosis campaign has been a most reliable and helpful agency.

The Bureau of Animal Industry of the United States Department of Agriculture began the studies of the action of tuberculin

soon after it was discovered by Robert Koch, of Germany, in 1890. In fact, the Bureau of Animal Industry began the manufacture of tuberculin in 1893, and its laboratories have been producing this product ever since. In recent years great quantities of tuberculin have been necessary for use in the cooperative campaign, making it especially important to have an adequate and reliable supply of tuberculin available at all times. This has been prepared by the bureau, or under Government or State supervision, which assures its purity and potency. (Fig. 1.)

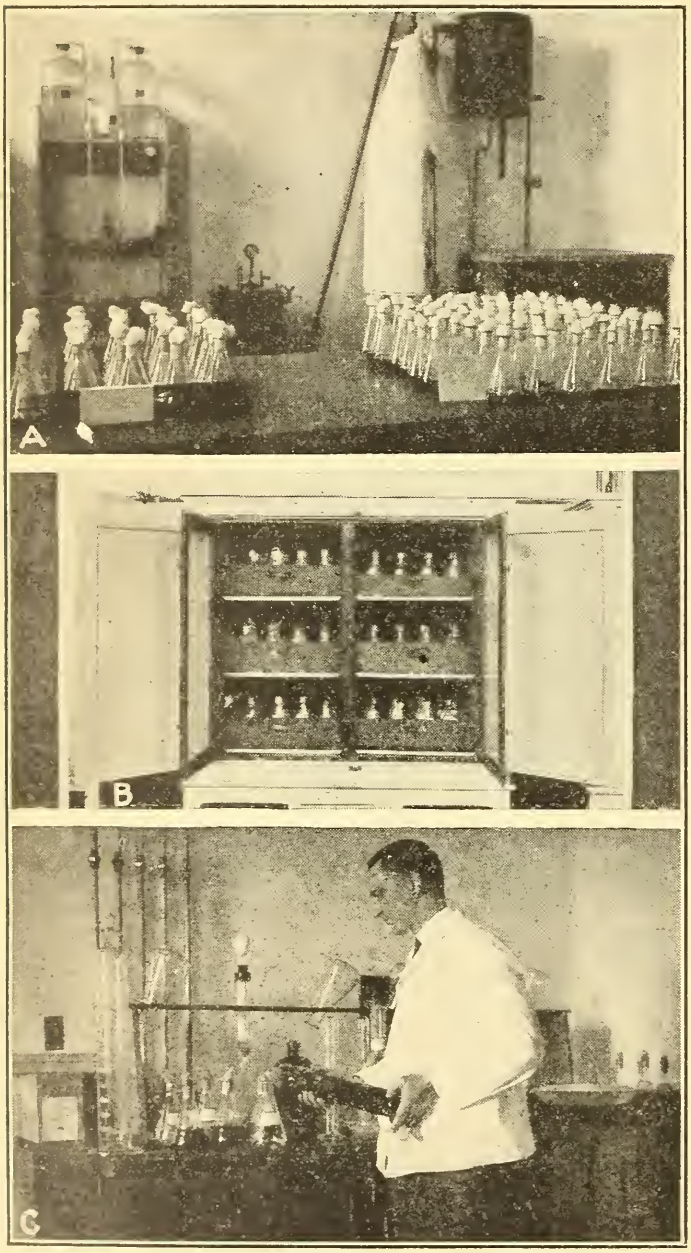

FIGURE 1.—Steps in the making of tuberculin: A, Culture media ready for use; B, pure cultures in an incubating unit; C, preparing tuberculin from sterilized cultures after filtration

NATURE OF TUBERCULIN

Although tuberculin has been in use for testing cattle for nearly 40 years, and although in this country it is used annually to test more than 10,000,000 cattle for tuberculosis, few persons have an accurate conception of what the product really is. According to the average idea it is some kind of product derived from germs of tuberculosis and hence must of necessity be more or less dangerous or harmful. On the contrary, tuberculin is the clear, sterile, culture filtrate obtained from the growth of tubercle bacilli on a beef-broth medium. This broth is essentially nothing but a meat extract, a consommé to which salt and glycerin are added. Tuberculin therefore consists of such parts of the broth and glycerin as the germ has [illegible] aking its growth. In addition, the tuberculin contains [illegible] ity of the material derived from the growth of the [illegible] er the germs themselves, either living or dead.

The product contains no substance that has any detrimental effect on a nontuberculous animal. It does, however, cause what is known as a reaction in tuberculous animals, making it of great value in the detection of tuberculosis in the living animal. Quantities of tuberculin, much larger than those ordinarily used in connection with the diagnosis of tuberculosis, have been injected into cattle with no detrimental effect whatsoever on healthy animals.

REACTIONS TO THE TEST

When the tuberculosis germ grows, it does not produce any substance which can be called a toxin or poison. The culture filtrates, or tuberculin, are entirely without effect in any reasonably conceivable dose when applied to healthy animals. Not even a suggestion of the lesions or symptoms of tuberculosis can be induced in healthy susceptible animals by the injection of tuberculin.

However, animals which are tuberculous are affected by tuberculin injections. This specific sensitiveness is such that tuberculous guinea pigs may actually be killed by tuberculin injections in doses which have no effect whatever on healthy guinea pigs. This reaction, of course, is due to the fact that the tuberculous animal is overly sensitive. The tuberculous animal is very much like the man who is subject to hay fever. The pollen of ragweed and other plants may cause a tremendous reaction in the susceptible hay-fever patient, whereas for the ordinary normal person such weeds are entirely harmless. It is an analogous condition that exists in connection with tuberculosis and tuberculin. The tuberculous subject is extremely sensitive, whereas the normal individual is not affected at all.

METHODS OF TESTING

Although tuberculin is the means by which tuberculous infection may be detected in animals, an accurate diagnosis depends likewise on ability to observe and interpret the results of the test. The Department of Agriculture requires that the official testing of livestock for tuberculosis be performed by trained veterinarians who have demonstrated their ability to make the test properly. Of the three official methods of tuberculin testing—the subcutaneous, intradermic, and ophthalmic (fig. 2)—the one most commonly used is the intradermic by reason of its greater suitability for testing under farm and ranch conditions. In the intradermic test, the tuberculin is injected into the skin and the reaction, in the case of a diseased animal, consists of a swelling at the point of injection.

EFFICIENCY OF TUBERCULIN AS A DIAGNOSTIC AGENT

Remarkable progress has been made since 1917 in the eradication of animal tuberculosis in the United States. More than 2,000,000 tuberculous cattle have been removed from herds in this country as a result of the tuberculin test. More than 180,000 herds containing 2,500,000 cattle in the United States are now on the fully accredited herd list, and more than 2,500,000 additional herds containing more than 20,000,000 cattle have passed one successful tuberculin test. Herds heavily infected with tuberculosis have been freed from the

disease in a few years by continued tuberculin testing and the enforcement of proper sanitary measures.

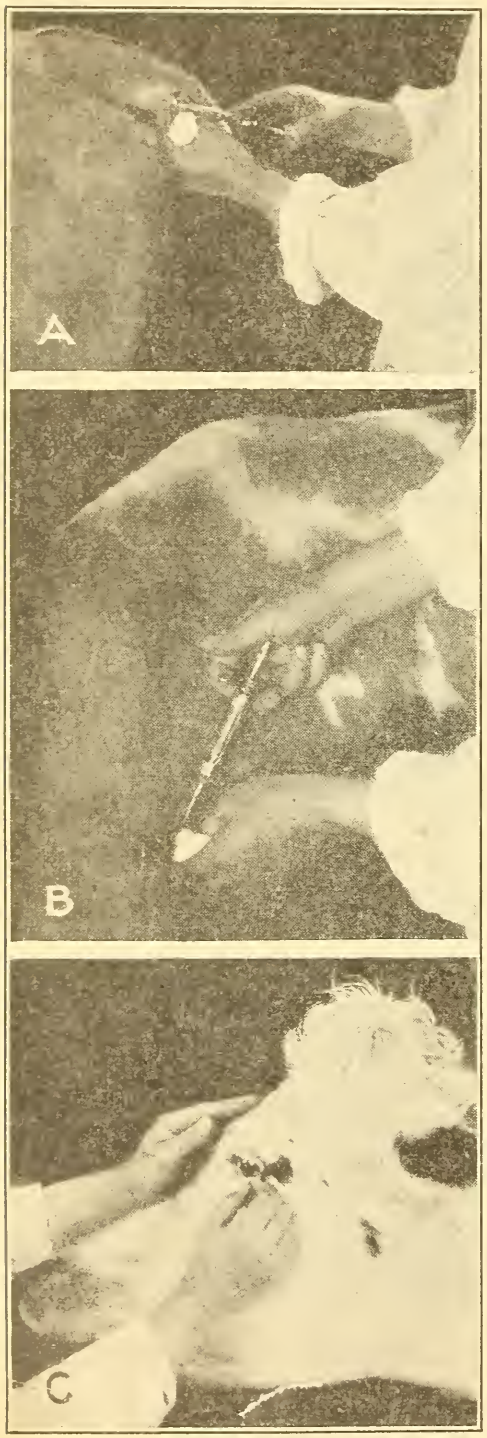

FIGURE 2.—Three methods of using tuberculin to detect tuberculosis in cattle: A, Intradermic; B, subcutaneous; C, ophthalmic. The intradermic method is the test principally used in cooperative tuberculosis-eradication work. The absorbent cotton held by the inspector is saturated with an antiseptic and is used to clean the site of injection. The needle of the syringe is cleaned and sterilized before each test

The diagnostic powers of tuberculin are remarkable when one considers the difficulty that surrounds the detection of many diseases in the living animal, and the systematic tuberculin testing of cattle has made it possible to eradicate bovine tuberculosis from large areas in this country. There are more than 1,000 counties, including three entire States—North Carolina, Maine, and Michigan—in what is known as the modified accredited area, meaning that the degree of infection of bovine tuberculosis does not exceed one-half of 1 per cent of all the cattle contained within such areas. Results of retesting in over 180 such areas indicate a high degree of testing efficiency. In four counties in Wisconsin, for example, a retest of all the cattle, three years after the first test, disclosed only 189 reactors among 187,678 cattle, or about 1 in 1,000. The counties were Monroe, LaCrosse, Portage, and Jackson.

Other evidence of the effectiveness of tuberculosis eradication, based on the tuberculin test, can be obtained from the records of the Federal meat-inspection service. This service covers the postmortem examination of approximately 9,000,000 cattle and 45,000,000 swine each year. There has been a very marked reduction in the amount of tuberculosis found among cattle and swine slaughtered under inspection in the last few years.

DETECTION OF ADVANCED CASES OF TUBERCULOSIS

Critics and opponents of the tuberculin test frequently state that it does not detect the badly diseased animals. This is not so except in a very small proportion of cases. Retests in herds occa-

sionally disclose advanced cases that did not respond to a single test. However, physical examination, the combination of tests, and retesting of herds locate these advanced cases that are occasionally missed by a single test.

On the other hand, of all the cattle that show lesions about 10 per cent are well-advanced cases and approximately 200,000 extensively infected reactors have been slaughtered under inspection since 1917. These facts distinctly show that tuberculin does detect the badly infected tuberculous animals in a great majority of cases. Of course, as the campaign progresses the old, chronic, advanced cases are being eliminated and the percentage of carcasses going to the fertilizer tank is being greatly reduced.

Again, critics frequently state that tuberculin causes the condemnation of the best cows in the herd. Although many outstanding animals react to a tuberculin test the bureau, in gathering information on this subject, found that about 33 per cent of a group of reactors numbering approximately 17,000 head were considered to be below the average in quality. It also found that about 25 per cent were above the average quality. These records were obtained chiefly on cattle of the dairy type. Of course, one hears a great deal about these 25 per cent but the critics are prone to overlook the 33 per cent of reactors below average.

EXPERIMENTS DISPROVE FANTASTIC BELIEFS

One criticism totally unsupported by the facts and manifestly a figment of the imagination, that lacks also the background of good judgment, refers to the appearance of the injected tuberculin in milk following the testing of cows for tuberculosis. It is alleged that, as a result of consuming milk from tested cows, babies are made seriously ill and adults suffer from rheumatism, heart disease, and even sterility. Such a suggestion to anyone who is informed on this subject is so fantastic as hardly to require discussion. Consider for a moment the amount of tuberculin injected into a cow when she is tested. The dose does not ordinarily exceed 2 or 3 small drops (one-tenth of a cubic centimeter). Careful laboratory experiments have shown that this amount of tuberculin does not contain more than one five-hundredth of a grain of total material which may arise from the growth of the tubercle bacillus. So far as the writer is aware most of the toxic substances known to man are without effect in a dose of one five-hundredth of a grain, so that even if this amount of tuberculin were placed in one glass of milk it would have no conceivable effect on the person who drinks it. But there is no such condition in tuberculin testing. The minute amount of material is injected into the skin. It is absorbed very slowly, requiring as a rule more than 48 hours to produce a reaction, and there is nothing whatever to indicate that any of it ever reaches the milk supply. If it did, the amount would be so extremely minute that the health of the consumer could not possibly be affected, even though tuberculin were a virulent poison. As already stated, however, tuberculin is not poisonous, but when given to normal guinea pigs by injection or otherwise, in doses twenty-eight thousand times greater in proportion to weight than those used for testing cattle, it is without any observable effect.

More than 75,000,000 tuberculin tests have been applied since 1917. from which it will be realized that full opportunity for knowledge and experience has been afforded. In not a single instance reported during the application of this vast number of tests has it been shown that any animal was adversely affected by the injection of tuberculin. Hundreds of herds have been tested repeatedly for from 10 to 20 years without any adverse effects, and in most instances these herds are outstanding ones in their communities.

However, in order to obtain definite experimental evidence relative to the possible appearance of tuberculin in milk from tested cows, the writer conducted the following investigations: It is well known how susceptible milk is to the flavor of garlic when cattle are turned on pasture in the spring. Within one-half hour after a cow was fed a small quantity of garlic, the flavor and odor of garlic were readily perceptible in the milk. However, when 30 cubic centimeters of undiluted juice from garlic stems (three hundred times the intradermic dose of tuberculin) were injected under the skin of cows, no taste or odor of garlic could be detected in any of the milk samples which were taken from the udders at one to three hour intervals for a period of two days.

With the view of studying this subject further, a highly distinctive aniline dye (methylene blue) was also injected into the tissues of a series of additional cows. A blue solution 40 times the intradermic dose of tuberculin was used. As in the case of the garlic injections, none of the milk samples examined over a 2-day period showed any evidence of abnormal color.

Additional tests were made with samples of milk from cows which were injected with thirty times the average dose of tuberculin. Milk was drawn from their udders, at the two regular milking periods after the injection, and 5 cubic centimeters inserted into the abdominal cavities of each of a number of tuberculous guinea pigs. None of these animals missed a meal nor developed any visible abnormal conditions whatever.

The experiment is considered to be a very sensitive one and had there been any tuberculin in the tested cows' milk, it certainly would have been noted in such overly sensitive animals as tuberculous guinea pigs are known to be when injected with minute quantities of tuberculin. On the other hand, critics of the test have never produced the evidence of a single experiment from a reliable source which would show that the injection of 2 drops of tuberculin (the customary dose) or even 4 cubic centimeters (rarely used) could result in the elimination of this product in the milk. Furthermore, there is not a reputable medical or veterinary college in this country nor a recognized authority on tuberculosis in the United States who does not teach that bovine tuberculosis is transmissible to children. Whether the percentage is large or small becomes very immaterial when children are being exposed to the disease by drinking infected milk. (Fig. 3.)

TUBERCULIN TESTING UNRELATED TO INFECTIOUS ABORTION

Still another criticism is that the tuberculin test is the cause of infectious abortion among cattle. This statement can not be substan-

tiated by any line of reasoning or by unbiased observation. Unfortunately, infectious abortion among cattle is a rather widespread disease in the United States. Naturally, any disturbance in the health of a herd of cattle that may follow the tuberculin testing will be attributed to the test by those not in favor of it.

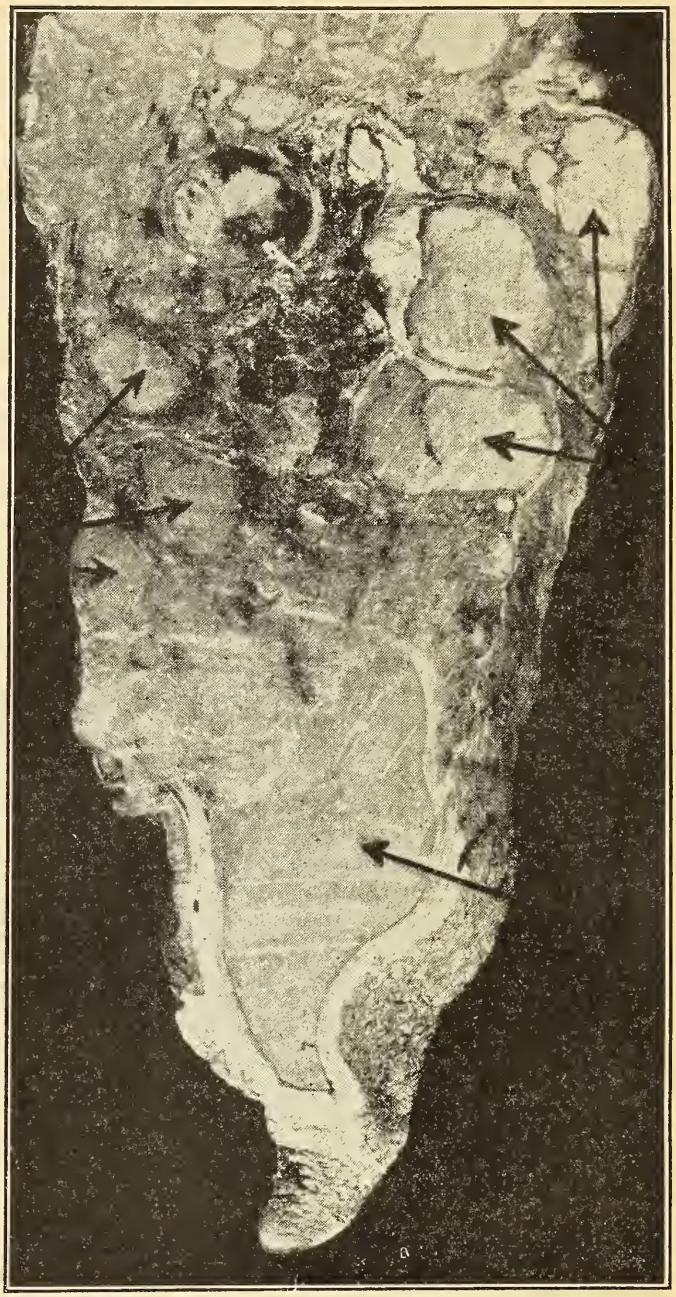

FIGURE 3.—Section of a tuberculous udder. Arrows point to well-developed lesions

However, there is absolutely no evidence to indicate that the tuberculin testing of cattle and the presence of infectious abortion are related in the slightest degree. Two large and valuable herds of cattle not far from the United States Capitol have been tuberculin tested semiannually for many years, and neither tuberculosis nor infectious abortion exist in these herds. This is also true of many other valuable herds of cattle in all parts of the United States. With the widespread activity in connection with the tuberculin testing of cattle in area work, there has been opportunity to make extensive observations on this subject. The results show that abortion disease has not been spread by the use of tuberculin nor by the application of any of the methods used to control and eradicate bovine tuberculosis.

ALLEGED IMPURITIES IN TUBERCULIN

Statements are sometimes made to the effect that tuberculin contains impurities which render it harmful. The efforts of laboratory workers to separate, in perfectly pure condition, the minute amount of material in tuberculin which causes the reaction, have led some,

in discussing such work, to refer to impurities in tuberculin. It should be remembered that the term "impurities," from the standpoint of a chemist and from that of a nonscientific person has a very different meaning. To the chemist any substance in tuberculin other than the actual precise substance which causes the reaction would be an impurity. To the ordinary man, however, impurity implies something that reduces the effectiveness of the active material or which actually imparts to the product undesirable or dangerous qualities. Tuberculin, as produced by the Bureau of Animal Industry, contains no impurities when considered from the latter standpoint. It does, however, contain a certain amount of material which is not apparently active in producing the reaction. That inactive material consists of salt, glycerin, or any unused portions of the beef extract. The greatest care is taken by producing laboratories to see that tuberculin is pure in the sense that it will produce no effect on normal animals. No tuberculin is ever shipped until it has been subjected to exacting tests for purity.

NO-VISIBLE-LESION REACTORS

At times the animals which react to the tuberculin test do not show visible signs of the disease when slaughtered. Though such cases are a small proportion of the total, yet they may cause doubt and misgivings among cattle owners. It is natural for the owner of a reactor which shows no visible lesions when slaughtered to think that the test was in error.

Tuberculosis commonly develops slowly up to a certain stage, depending on the amount of infection introduced into the animal, as well as on the virulence of the organisms, and the susceptibility of the individual. During the time when the disease is in the process of development in cattle a reaction will result upon application of a tuberculin test. An animal that reacts to the test under these conditions is very likely to show no visible lesions upon autopsy, even though the most careful technic is followed.

The actual incidence of so-called no-visible-lesion cases is only 0.2 per cent, or 2 animals out of every 1,000 tested. But even this small proportion is not a reflection on the accuracy of the test, since microscopic examinations of numerous specimens, from cases apparently having no lesions, have shown a large number of infected tissues. Thus the low percentage of cases in which lesions were not observed is reduced still further by positive laboratory findings.

The tuberculin test indicates the presence of the disease but does not show the progress which the infection has made within the body. Usually the disease affects only a small number of organs which are always examined by inspectors. But it has been found also, through more searching examinations, in more than 50 different locations in bovine carcasses, including remote places not commonly observed in routine post-mortem examination. Hence, in the early stages of the disease, it is entirely possible for an animal which is actually infected with tuberculosis to show no visible signs on either ante-mortem or post-mortem examination. The best scientific evidence and observations of millions of carcasses indicate that the tuberculin test is more reliable than the customary post-mortem examination as a means of detecting tuberculosis.

RETESTING REACTING CATTLE

The fact that a tuberculous animal may react only once in a series of tests over a long period of time was definitely established many years ago. The bureau caused 343 reactors to be retested experimentally with the result that 129, or 38 per cent, did not react. When these animals were slaughtered 21 proved to be generalized cases. Had they been returned to the herds from which they had been removed, serious results surely would have followed.

Although veterinarians, being only human, can not be considered infallible, they are most efficient in their aptness in administering the tuberculin test. This fact is established beyond doubt by post-mortem reports covering the slaughter of thousands of reacting animals.

The result of the application of the tuberculin test to a herd of cattle does not show to what extent the reactors are diseased, but, in the operation of any plan that will be successful in the control and eradication of an infectious disease such as tuberculosis, slightly infected animals can not be left in the herd with safety. This fact makes the operation of the campaign an expensive one. It is not surprising that the people of this country hesitated for many years before launching upon a strenuous and nation-wide campaign to stamp out this animal disease.

Now that the campaign has developed to its present stage, livestock owners are determined to complete the task. Results everywhere apparent clearly indicate a very hopeful outlook for it.

COURT DECISIONS UPHOLD TUBERCULIN TESTING

A noteworthy legal opinion bearing on the use of the tuberculin test appears in a court decision handed down July 15, 1930, by Royal A. Hawley, circuit judge of Ionia, Mich. A case which questioned the validity of the law authorizing the tuberculin test was filed against the State by a cattle owner. After full consideration Judge Hawley upheld the right of the State to test, condemn, appraise, and slaughter privately owned cattle in the campaign to eradicate bovine tuberculosis. He held that the law is a necessary public-health measure and comes within the authority of the State. The decision stated:

> It can not be successfully denied that the State has the power to enact legislation requiring the condemnation and destruction of tuberculous cattle and to do so with or without allowing any compensation to the owner for such destruction. * * * The State, however, as well as the Federal Government, does allow compensation for the animals destroyed.

A few days after the decision was rendered, the cow on which the case rested was slaughtered under the supervision of State and Federal veterinarians. The post-mortem examination disclosed tuberculous lesions in the lungs and several glands.

Another recent legal opinion was that rendered by the Iowa Supreme Court, September 22, 1930. The court, consisting of three judges, held the bovine-tuberculosis law of Iowa to be constitutional and approved the tuberculin test. In rendering this verdict the court reversed a former decision of a local judge in Mitchell County. The supreme court said: "Careful reading convinces us that the

test is reliable, useful, and advantageous." The decision also upheld the view that bovine tuberculosis can be transmitted to human beings.

MEAT-INSPECTION RECORDS REVEAL LESS TUBERCULOSIS

The records of the Federal meat-inspection service give evidence of the most conclusive kind that, since systematic tuberculosis eradication was begun, in 1917, there has been a marked decline in tuberculous infection among cattle. This service involves the veterinary examination of approximately 9,000,000 cattle and 45,000,000 swine annually, in addition to other food animals which are not commonly infected with tuberculosis. The figures—excluding reactors detected

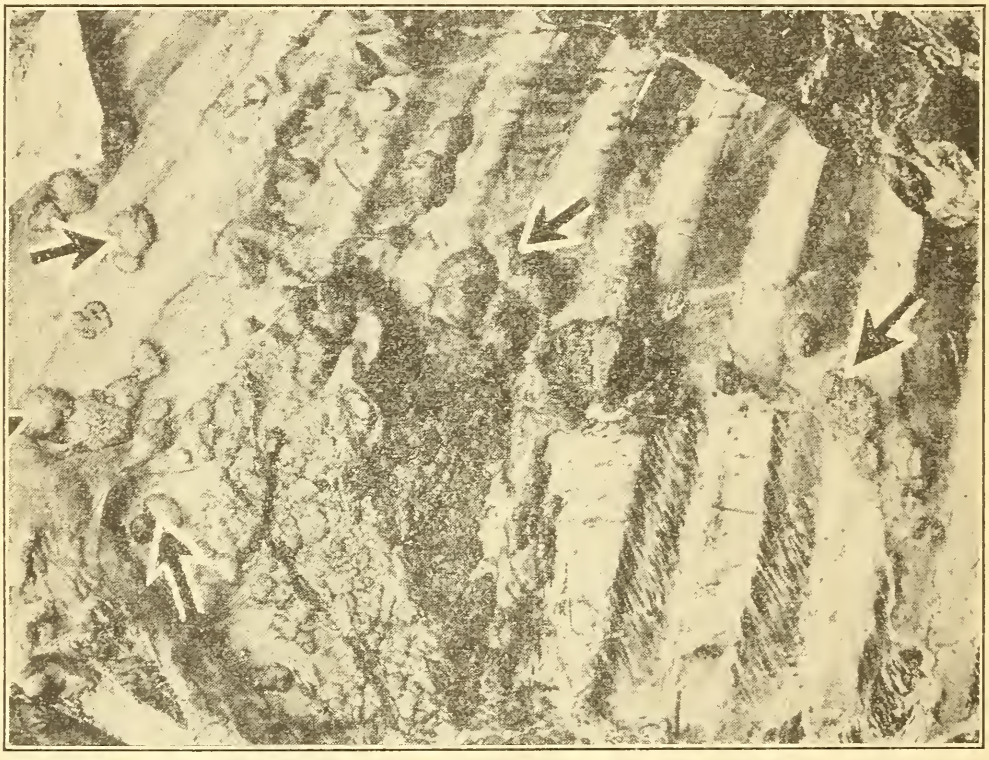

FIGURE 4.—Portion of the fore quarter of a beef carcass. Arrows point to nodules of generalized tuberculosis

by tuberculin testing—show that 2.1 per cent of the cattle slaughtered in 1917 were affected with tuberculosis, as compared with only 1 per cent in 1929.

REACTORS SLAUGHTERED UNDER MEAT-INSPECTION RULES

In the testing of cattle for tuberculosis, officials and inspectors of the Bureau of Animal Industry frequently are asked to explain the disposal made of reactors to the test. Such cattle are slaughtered under Federal meat-inspection rules. Carcasses showing evidence of generalized tuberculosis may be used only for such purposes as fertilizer or other inedible products. (Fig. 4.)

When the lesions are small or localized, however, and after all parts so affected have been removed, the remainder of the carcass may be passed for food purposes. The basis for this policy is explained

in the following discussion, which is prompted by frequent suggestions that reactors to the tuberculin test should be totally destroyed.

The total destruction of the carcasses of all reactors is not a new idea. Questions are received periodically from persons who have not understood how any part of the carcass of an animal which reacted to tuberculin and was condemned as unfit for breeding and dairy purposes could be passed as fit for food.

This matter has been given most careful consideration from the standpoints of both public health and economy. The disposition of carcasses slaughtered under the meat-inspection act is founded on sound principles, established by eminent physicians and veterinarians. Furthermore, the greatest care is used in carrying out these principles in the post-mortem inspection and disposition of the affected animals.

The term "healthy" animals is a relative one; very few living creatures are free from abnormalities and minor ailments, diseased conditions, or the presence of parasites. In the course of slaughtering livestock which have not been subject to the tuberculin test, tuberculous animals frequently are found among the best steers, bulls, beef cows, dairy cows, calves, and hogs; and the same principles are applied to the inspection and disposition of all tuberculous animals, whether they originate within or without the areas engaged in tuberculosis-eradication work. The inspection is conducted uniformly in all cases and in all establishments throughout the entire country.

Scientists consider meat among the minor factors in the transmission of bovine tuberculosis to human beings. The principal means of its transmission is the raw milk of tuberculous cows. In every land and in every generation from early periods the human race has endeavored to make meat and other food products safe for mankind. In ancient times the Egyptians, in their food laws, designated certain animals—the hog, for instance—as unclean, and forbade men to eat of them. This prohibition was accepted by Semitic races and was incorporated into the Mosaic laws of the Israelites, but the Greeks and Romans had no prejudice against pork in their control of the meat supply. The Mohammedan food regulations of to-day are similar to the Egyptian food laws of ancient times. A thoroughly safe meat inspection can not be conducted on the basis of ancient belief. Such a service must be founded on scientific facts established through acquired knowledge of the various diseases.

When an animal reacts to tuberculin the reaction does not indicate the extent of the disease. On post-mortem examination many reactors consigned to the shambles show but slight local lesions. To consign entire carcasses of such animals to the fertilizing tank, or to bury such carcasses would be like throwing entire bunches of grapes into the garbage because one or two small grapes on a bunch were unsound. It would be a willful waste of much wholesome food. It is presumed that those who question the present procedure of passing, as fit for food, wholesome meat from tuberculous animals would not wish to make any exception between tuberculosis in cattle and tuberculosis in swine, and would have the entire carcasses of both cattle and swine condemned regardless of the fact that in a very high per

cent of tuberculosis in both classes of animals the infection extends only to a few of the lymph glands or is localized in some organ.

Carcasses showing only such localized, encapsulated, or calcified lesions are passed for human food after removal of the affected parts. An ample quantity of surrounding tissue, also, is condemned along with the locally diseased parts. All generalized cases are condemned and sent to the fertilizer tank.

The commitment to the fertilizer tank of the entire carcasses of all tuberculous animals without consideration of the nature and extent of the disease would impose upon the public a far greater economic loss than most people believe until they look carefully into the matter. The swine found to be only slightly affected with tuberculosis in recent years number about 5,000,000 annually. At an average live weight of 200 pounds and a market value of 10 cents per pound, the aggregate annual value of such hogs would exceed $100,000,000. The cattle affected to a very slight degree, as observed at federally inspected abattoirs, number about 200,000 annually. At an average weight of 1,000 pounds and a market value of 7 cents a pound, the loss from that source would amount to about $14,000,000. The loss of both cattle and hogs would thus amount to about $114,000,000 annually.

After due consideration of the full merits of the case, unprejudiced minds will approve the practice now followed in the United States and in practically all foreign countries with respect to disposing of meat-producing animals at the time of slaughter. The condemning of entire carcasses of cattle and swine found to be tuberculous has been discussed many times. It has been thoroughly considered by the best authorities on meat inspection and, in the light of the best knowledge, the present procedure fully protects the public health and at the same time conserves our meat supply.

Several years ago a commission was appointed to make an investigation of the meat-inspection service of the United States. Among the recommendations submitted the following statement was made:

> If there be any general error in the recommendations this is in favor of the public rather than in favor of the butchers and packers. Several sections could be made less stringent without any danger to the health of the consumer.

ERADICATION METHODS HAVE REDUCED EXTENT OF DISEASE

Controlling and eradicating tuberculosis of livestock in the United States were put off for many years because of misunderstanding on the part of livestock owners and others. However, livestock owners during recent years have shown a strong sentiment in favor of the work.

It would be regrettable if progress in combating tuberculosis were retarded through the dissemination of misinformation regarding the nature of the disease, the matter of handling the campaign, the disposition of tuberculous cattle, and other phases of the subject. Several agencies are attacking the work through prejudice against any organized method of controlling disease by scientific methods. These agencies do not believe in the germ theory, or the spread of disease from animal to animal or from man to man.

The livestock industry of the United States, with respect to tuberculosis, is in a very favorable condition compared with the livestock

industry of foreign countries. In many of these countries the disease has spread beyond control and there is no possibility of eradicating it, whereas in the United States the average percentage of the disease among cattle is now slightly less than 1.7 per cent. If the cooperative campaign is continued as vigorously and successfully as it has been since 1917, within a few years the disease will be absolutely under control, and it will gradually diminish until it is reduced to the minimum, if not entirely eradicated.

SUMMARY

The tuberculin test has been known and used for nearly 40 years; it is our most dependable means of detecting tuberculosis.

Tuberculin is a clear, sterile product that can have no possible harmful effect on healthy animals.

The milk of cows is not affected in any way by the application of the tuberculin test.

The proper application of the tuberculin test bears no relation to the occurrence of infectious abortion or other diseases in animals.

The great majority of animals that react to the test show plainly visible lesions of tuberculosis on post-mortem examination; others disclose early stages of development of the disease; and only in rare instances—about 2 in 1,000 animals tested—are visible signs of tuberculosis lacking.

The system of Federal meat inspection under which the disposal of reactors is made prevents a huge economic loss to livestock producers and at the same time protects public health.

Meat-inspection records show a marked decline in tuberculosis of cattle and hogs slaughtered in federally inspected plants since systematic eradication work was begun.

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